REMARKS

1. **Specification.** In the communication from the Examiner dated March 26, 2003, the Examiner objected to the disclosure. The Examiner thought that the description on page 7, lines 10-15 was not in line with the scope of the invention according to Figure 5. The description has been amended as set forth above to conform to the scope of the invention according to Figure 5. Figure 5 discloses the line guide 15 as a vertically extending elongated ring. The reference to a circular line guide has been removed. It is respectfully suggested that the disclosure as now amended is now in line with the scope of the invention. No new matter has been added. Considering the foregoing, it is respectfully requested that the objection to the Specification be withdrawn.

2. **Claim Rejections - 35 U.S.C. § 112.** The Examiner rejected claims 4 -20 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It was thought unclear what centerline of the recessed channel was in alignment with the mid-point of the line guide.

Claims 4, 13 and 18 contain the statement "in alignment with the centerline of said recessed channel" and the Examiner thought that the statement was unclear as a reference point. The specification at page 6, lines 2-6 discuss the position of the line guide (15) with respect to the line holding channel (26). The specification provides:

> It is also thought that the line will be distributed more readily from the

> line-holding channel (26) of the revolving spool (20) when the line guide (15) is positioned on the line guide support (13) so as to place its vertical mid-point no lower than approximately the vertical mid-point of the line-holding channel (26) and no higher than approximately the top rim of the line holding channel (26).

Claims 4, 13 and 18 have been amended to reflect the relationship between the vertical mid-point of the line guide and the vertical mid-point of line-holding channel. Claims 5-12 depend upon Claim 4, Claims 14-17 depend upon Claim 13 and Claims 19 –20 depend upon Claim 18. It is respectfully suggested that claims 4 - 20, as now amended, are clear as to what centerline of the recessed channel is in alignment with the mid-point of the line guide, as required by 35 U.S.C. § 112, second paragraph and Applicant respectfully requests that the rejection of claims 4-20 under 35 U.S.C. § 112, second paragraph be withdrawn.

3. **Claim Rejections - 35 U.S.C. § 102.** The Examiner rejected Claims 1-3, 5 and 13 under 35 U.S.C. § 102(b) as they were thought to be anticipated by Russell (1,654,667). Claim 1 has been amended to include the limitations of claim 2 and claim 2 has been cancelled. With regard to claim 1 it was thought that Russell disclosed a fishing reel having a transversely orientated, *revolvable* cylindrical spool 2 mounted to the frame 1 and a recessed channel for holding a length of fishing line, means for positioning 6 the fishing line onto the channel of the spool 2, and a mean for controlling the rotation of the spool. It is respectfully suggested that the reel disclosed in Russell does not disclose the features of

Claim 1 of applicant's invention. Applicant's claims are directed to a bait-casting reel. Bait-casting reels, as they are known, utilize a revolving-spool to cast a fishing lure.[1] The reel revolves during the cast and the weight of the lure pulls line from the revolving spool while the lure is flies toward the intended casting target. (See Applicant's specification at page 3, lines 9 – 10 and page 4, lines 6 – 11.) As set forth in Applicant's specification certain bait-casting techniques increase the tendency of the fishing line to "backlash" and tangle on the reel spool. (See Applicant's specification at page 2, lines 18 – 20.) "Backlash" is customarily defined as the tendency of the line of a bait casting reel to tangle due to spool overrun.[2]

The reel disclosed in Russell (1,510,904 and 1,654,667) is a spring-winding fishing reel and is typical of those automatic reels used for fly fishing. These reels revolve to collect and hold line after or before a cast but do not revolve during the case to dispense the line and lure.[3] Neither of the Russell patents suggest or disclose that the spool 2 is revolving during the casting of a lure. A reel having the line spool revolving during the casting of a lure is an inherent feature of the bait casting reel set forth in applicant's specification. For instance,

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[1] *Fishing Encyclopedia – Worldwide Angling Guide,* by Ken Schultz, pp. 102 - 114, IDG Books Worldwide, Inc. Copyright 2000 by Ken Schultz, enclosed.

[2] Backlash – *The tangle of line that develops on the spool of a revolving spool reel as a result of the differential between the speed of the line moving through the rod guides and the amount of line being made available to follow the lure by the spin imparted to the reel spool. In essence, the spool moves faster than the line can depart, causing the spool to over run the line and pile up line on the spool. Fishing Encyclopedia – Worldwide Angling Guide,* by Ken Schultz, p. 93, supra.

[3] *Fishing Encyclopedia – Worldwide Angling Guide,* by Ken Schultz, pp. 661 - 665, supra, enclosed.

in the specification at page 7, lines 8 – 10 the specification reads:

> The substantially rectangular configuration of the channel (26) allows the coiled fishing line (28) to be distributed from the spool (20) uniformly as the spool (20) revolves to discharge the line (28) during a cast.

Applicant has amended Claim 1 and 13, for clarity, and to show that the claimed features are for bait casting reels where the spool revolves to dispense line during the cast.

In response to the rejections of dependent Claims 3 – 12 and Claim 13 it is respectfully suggested that the subject matter of each claim as a whole must be taken into consideration and to do so affirmatively involves taking into account all of the limitations of a particular claim. In this case, Claims 3 - 12 must be considered to have all of the limitations of their base claim and any intervening claims. When these limitations are considered, the cited references do not suggest or disclose the claimed combination. It is respectfully suggested that focusing on the shape of the line guide alone or on the shape of the spool alone would be an improper interpretation of the claim. The claim must be read as a whole and each of the limitations must be considered. For example, while Russell may disclose a spool having a recessed channel or a substantially circular line guide, these features must be viewed in light of all of the limitations of Applicant's claims 1, 2 – 12, 13 and 18, which are to be considered as a whole. When this is done the additional limitations, such as the "means for controlling the rotation of said spool and thereby dispensing said fishing line from said channel as said spool rotates during the casting of a fishing lure and on to said channel as

said spool rotates during retrieval of said fishing lure" would prevent rejection under 35 U.S.C. § 102(b). There is nothing in Russell that discloses or even suggests each and every limitation of Applicant's claims or all the limitations of the base claims and any intervening claims. From the foregoing it is respectfully suggested that Claims 1, 3, 4, 5 and 13, as amended, are not anticipated, disclosed or suggested by the disclosure of Russell (1,654,667) and Applicant requests that the rejection under 35 U.S.C. § 102(b) be withdrawn.

4. **35 U.S.C. § 103(a).** Claims 6, 7, 11, 12, 14, 15, 16 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Russell. With respect to Claims 6, 11, 14, and 16, while it was thought by the Examiner that Russell did not disclose specific values for the diameter of the line guide and the width of the line channel, one of ordinary skill in the art is expected to routinely experiment with the parameters specifically when the specifics are not disclosed, so as to ascertain the optimum or workable ranges for a particular use and that it would have been no more than a matter of obvious engineering design choice to select the claimed ranges. In response this rejection Applicant respectfully suggest that the one cannot base obviousness upon what a person skilled in the art might try or might find obvious to try but rather the art must consider what one might be led to do in light of the prior art. Russell discloses a line guide that is pivotally mounted to swing transverse to the reel spool. See Russell lines 50 – 55 and Fig. 4. Since Russell teaches a swinging line guide it is respectfully suggested that one would not consider adjusting the dimensions of a fixed line guide for optimum performance.

It is also suggested that Russell does not consider the line guide dimensions or position as a potential remedy for controlling "backlash" in a spool that revolves during the cast. Nothing in Russell even suggests that the spool revolves during the casting of a lure. Rather, The line guide of Russell is designed for a substantially different purpose, to prevent wear on the line as it played back and forth on the spool. See Russell lines 5 – 10. It is the swinging position of the line guide as a means to prevent line wear, not the width or length or the guide as a means for controlling backlash, with which Russell is concerned. Consequently, adjustments in the line guide dimensions or the width of the line spool as it relates to the "swinging" guide of Russell would not be an ordinary concern or an indication for experimentation for engineering design choices. Russell would suggest, if anything, modifications to the length of the arc the guide might swing, not the size and shape of the guides or the spool.

Applicant also respectfully suggests that all of the limitations of the claims must be considered and that the claims, as amended, are not suggested by Russell. It is suggested that it would be incorrect to focus the §103 inquiry on a particular limitation or on the "gist" of the invention relative to prior art. The differences between the Claims and the cited references must be considered. See *In re Gulack*, supra. When these limitations are considered, the cited references do not suggest or disclose the limitations of Applicant's claims.

In regard to claims 7, 12, 15 and 17 it was thought that Russell teaches the center of the line guide is positioned no lower than the approximately vertical mid-

point of the channel and no higher than the rim of the channel because the line guide of Russell is fixedly adjustable to these requirements as shown in Fig. 4 of Russell (1, 654, 667). In Russell (1, 654, 667) the line guide eye 7 is provided with an arm 8 that is pivotally supported to swing in an arc transverse to the spool along a slideway 5. See Russell lines 50 – 55. Consequently, Russell does not teach fixing the line guide at approximately the vertical mid-point of the channel and no higher than the rim of the channel. Instead Russell teaches not fixing the line guide at all but rather letting it move freely along the slideway 5 because this "prevents the distortion of the line guide under severe stresses or pulls on the line." In essence Russell teaches away from fixing the line guide at a specific point. It is respectfully suggested that there can be no *prima facie* obvious rejection under 35 U.S.C. § 103(a) when, as in this case, the prior art reference teaches away from the claimed features and as a consequence because the line guide of Russell swings and is not fixed it cannot be used to support such a rejection. It should also be noted that the function of the line swinging guide of Russell would be destroyed by fixing the line guide at a point between the vertical mid-point of the channel and the rim of the channel because fixing the line guide would according to Russell subject the line guide to "severe stress or pulls on the line." It is respectfully suggested that in cases where the cited reference must be modified one of ordinary skill in the art would not find reason to make the proposed modification and that rejection of Applicant's claims on the basis of obviousness under 35 U.S.C. § 103(a) cannot be properly made.

Considering the foregoing it is respectfully asserted that claims 6, 7, 11, 12, 14, 15, 16 and 17, as now amended, are not suggested or disclosed by the cited references and Applicant respectfully requests that the rejection of these claims under 35 U.S.C. 103(a) be withdrawn.

Claims 8 – 10 and Claims 18 – 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Russell in view of Sato. The Examiner noted that Russell failed to show a line guide as a vertically extending elongated ring. However, the Examiner thought that Sato, in Figure 8, showed the line guide 5 as a vertically extending elongated ring and that it would have been obvious to one of ordinary skill in the art to modify the line guide of Russell to include a vertically extending ring as suggested by Sato to minimize line tangling and backlash. In response, to the rejection of Claims 8 - 10 and 18 – 20 as being unpatentable under 35 U.S.C. § 103(a) over Russell in view of Sato, Applicant respectfully asserts that this combination does not disclose each and every element of Applicant's claims. As noted above, the line guide 5 of Russell is not fixedly adjustable so as to allow it to be fixedly positioned between the vertical mid-point of the channel and no higher than the rim of the channel. Rather, the line guide 6 of Russell is mounted on a pivoting arm 8, so that it is allowed to swing freely along the guideway 5. It is not fixed in a constant position but moves in the direction of the string pull ostensibly to limit line wear caused when the guide eye is located in a fixed position. See Russell at lines 36 – 58 and Figures 1 and 4. In Sato, the line guide 5 as shown in Fig. 1 – 8 and in Fig. 17 is included as part of a level wind mechanism R including a screw

shaft 3, a guide rod 4 as well as the line guide 5. See Sato at Col. 2, line 66 to Col. 3, line 3. A level wind mechanism is a mechanism that moves the line guide to disperse the fishing line evenly across the spool as the spool revolves.[4] The function of the level wind system is to eliminate line buildup on the spool. Nothing in Sato suggest that a stationary elongated line guide, in the absence of the level wind system, would serve to reduce or eliminate backlash during casting. In fact Sato teaches away from the use of a stationary line guide. Further, Applicant suggests to the Examiner that no structural (or functional) difference between the claimed invention and referenced art may be ignored. In Sato the line guide moves as part of the level wind system, in Russell the line guide also move, Applicant claims a line guide fixed in position along with a spool that rotates during the cast. Note that Applicant has amended claim 18 to include the limitations of claim 20 and claim 20 has been cancelled. Nevertheless, and considering the foregoing, it is respectfully suggested that Russell and Sato do not teach each and every limitation of Applicant's claims 8 – 10 and 18 and 19, as amended, and thus do not serve as proper references under 35 U.S.C. § 103(a) to support a rejection.

With regard to claims 9 and 10, the Examiner noted that Russell as modified by Sato do not disclose specific values for the line guide diameter or channel width. However, it was thought that one of ordinary skill in the art would routinely experiment with these parameters so as to ascertain the optimum or workable ranges for a particular use. With regard to claims 10 and 20 it was thought that

[4] *Fishing Encyclopedia – Worldwide Angling Guide,* by Ken Schultz, p. 107, supra, enclosed.

Russell as modified by Sato teaches the center of the line guide is positioned no lower than approximately the vertical mid-point of the channel and no higher than the rim of the channel. The line guide of Russell was thought to be fixedly adjustable meet these requirements as shown in Russell in Figure 4.

In response, to the rejection of Claims 8 - 10 and 18 – 20 as being unpatentable under 35 U.S.C. § 103(a) over Russell in view of Sato, Applicant respectfully asserts that this combination does not disclose each and every element of Applicant's claims. Applicant asks that the Examiner take note that Clam 18 has been amended to include the limitations of Claim 20 and that Claim 20 has been cancelled. Further, as noted above, the line guide 5 of Russell is not fixedly adjustable so as to allow it to be fixedly positioned between the vertical mid-point of the channel and no higher than the rim of the channel. Rather, the line guide 6 of Russell is mounted on a pivoting arm 8, so that it is allowed to swing freely along the guideway 5. It is not fixed in a constant position but moves in the direction of the string pull ostensibly to limit line wear caused when the guide eye is located in a fixed position. See Russell at lines 36 – 58 and Figures 1 and 4. Similarly, the line of guide 7 of Sato moves to disperse line across the spool as part of a level wind mechanism. See Sato at Col. 2, line 66 to Col. 3, line 3. These systems teach away from applicant's use of a stationary line guide fixed at a desired location. Even if the line guides of Russell or Sato were fixed into position within the claimed range, all of the limitations of applicant's claims as amended are not included in the cited references. The

limitation "means for revolving said spool during the casting of said fishing lure and thereby extending said fishing line during casting of a fishing lure" is not disclosed by Russell and while such means is disclosed in Sato, Sato teaches away from a fixed line guide because it discloses the use of the level wind system. Consequently, it would not be thought obvious to one of ordinary skill in the art to use a fixed line guide with a reel whose spool revolves during the casting of a lure when the cited reference use moving and/or pivoting line guides. With regard to the claimed specific value limitations for the line guide diameter or channel width, again Applicant respectfully suggests that all of the limitations of the claims must be considered and that the claims, as amended, are not suggested by Russell. It is suggested that it would be incorrect to focus the §103 inquiry on a particular limitation or on the "gist" of the invention relative to prior art. The differences between the claims and the cited references must be considered. See *In re Gulack*, supra. When these limitations are considered, the cited references do not suggest or disclose the limitations of Applicant's claims. Nothing in the cited prior art suggests a relationship between the dimensions of the line guide and the dimensions of the spool width as a means for controlling "backlash" or line tangling. Consequently, there is no suggestion that experimentation in this area would be indicated or suggested as a basis to pursue a solution to line tangling or "backlash." Applicant respectfully suggests that the test is not "obvious to try" such design choice but "obvious to do" these choices. Since the cited references do not disclose or even suggest the claimed

relationships between the line guide dimensions and spool channel width, which are key structural elements of these claims and that as such cannot be ignored, there is no indication that alteration of the relationships would be obvious to a person ordinarily skilled in the art to which the invention pertains as a means to control backlash and line tangle and therefore there is no basis for rejection of claims 8 – 10 and 18 and 19, as may be amended, under 35 U.S.C. § 103(a). See *In re* Clinton, 527 F.2d 1226, 168 USPQ 365 (CCPA 1976); In *re Antonie*, 559 F. 2d 618, 195 USPQ 6 (CCPA 1977) and *In re Gulack, 703 F. 2d 1381, 217 USPQ 401 (Fed. Cir. 1983).*

5. **New claims.** Applicant has added new claims 21 – 26 to further define applicant's claimed invention.

Considering the foregoing it is respectfully requested that this Amendment, including the new claims listed, be entered in the record and that after due consideration that Applicant's claims, as amended herein, be reconsidered and deemed to be in a position for allowance and that the examiner withdraw his rejections, so as to allow the pending claims and this case pass to issuance.

Respectfully submitted,

By: _____

William W. Stagg, Attorney for Applicant
Reg. No. 31,225
P.O. Box 51308
Lafayette, LA 70505
(318) 233-0300
(318) 233-0694 FAX

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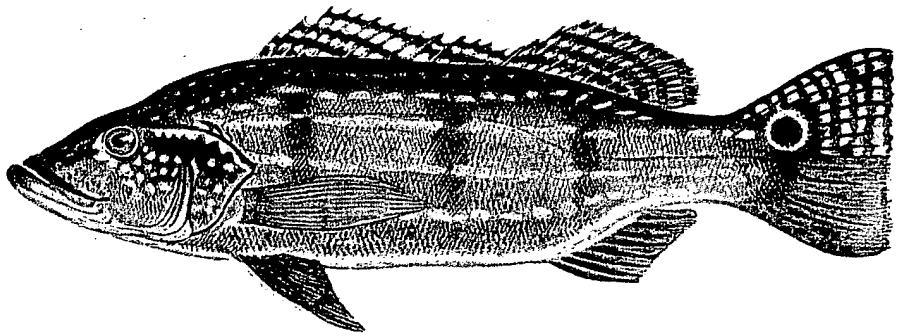

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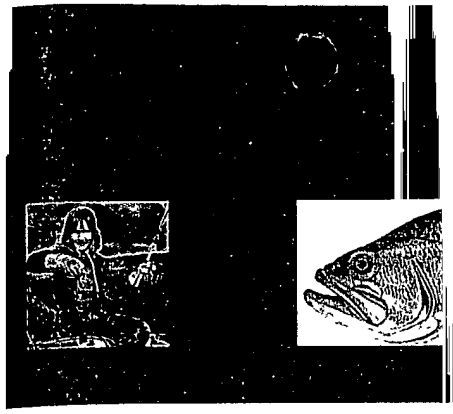


B

BACK BOUNCING

See: Backtrolling.

BACK CAST

The backward motion of the rod and line in flycasting.

See: Flycasting Tackle.

BACKING

Reserve line that is connected to the main line on the spool of a reel for situations when greater line lengths are necessary. Backing is normally of a different type or strength than the main line and is most commonly used on flycasting reels, where it is attached to the fly line, since it is practical to cast only a certain amount of fly line. Backing may be employed with other forms of tackle, although in these it is most common to use a continuous length of the same line to fill the spool.

See: Flycasting Tackle.

BACKING DOWN

A boat manipulation tactic primarily used in offshore fishing *(see)* to help an angler gain line when hooked up to a large and strong fish. The boat is driven in reverse, with its stern facing in the direction of the fish and the line. The angler winds line on the reel while the boat backs (often swiftly) toward the fish. The boat captain backs down instead of turning and heading toward the fish so he can see the line and the position of the fish. This prevents the boat from interfering with the fish and also prevents slack from developing in the line.

This fish-fighting strategy may be necessary when a fish has taken an exceptional amount of line and the angler is in danger of losing all the line on the reel. It may also be used where significant boat traffic or obstructions could enable a fish to break the line. Because anglers have more control over a fish on a short length of line than a long one, backing down will narrow the distance to the fish and possibly help prevent its loss. This tactic may be put to use unfairly by anglers employing light tackle in open water (often when fishing during a contest or for the sake of establishing a light-line record). By lessening the effect of a long length of line on light tackle and reel drag, the angler can bring a fish to capture more quickly than would have been possible otherwise.

See: Playing Fish.

BACKLASH

The tangle of line that develops on the spool of a revolving spool reel as a result of the differential between the speed of the line moving through the rod guides and the amount of line being made available to follow the lure by the spin imparted to the reel spool. In essence, the spool moves faster than the line can depart, causing the spool to overrun the line and pile up line on the spool. The causes and preventions for this are discussed in other entries *(see: baitcasting tackle; conventional tackle).*

One way to attempt to remove a backlash in a revolving spool reel is to put the reel in gear, tighten the drag so it doesn't slip, press the thumbnail of your rod-holding hand on the snarl to flatten and relax the coils, take two or three turns of the reel handle, put the reel in gear, and pull out the line. This does not tighten the coils and should allow you to get all but the worst backlashes out in a few seconds. Make sure you reset the drag.

Many people pick at the backlashed loops of line with their fingers. To do this, put the reel in freespool with your thumb on the spool. Carefully pick away at the leading loops to remove tightening overwraps until you get to the loop that is dug in the worst; then pull it out. Get all snarled line segments out before rewinding the line on the spool, and do not wind over any loops.

See: Casting.

BACK-REEL

The activity of turning the handle on a reel backward. This is possible on reels with direct drive, and also on baitcasting, spincasting, and spinning reels that have a selective anti-reverse, in which the user can elect to turn the anti-reverse mechanism off, thus allowing the drive gear to move either forward or backward, as well as the handle of the reel to turn forward or backward.

In the past, when reel drags were poor and often unreliable, anglers felt more comfortable when playing a strong fish if they could reel backward to let line out to play the fish. Many were accustomed to doing this with baitcasting, or levelwind, reels, which initially had direct drive and had to be back-reeled, or wound backward, when a strong fish put a lot of pressure on the reel.

The trouble with back-reeling is that rarely can you reel backward quickly enough to keep up with a rapidly turning handle when a strong fish speeds off; therefore, you have to let go of the handle,

bass) refer to a lure as a "bait" even though it is strictly artificial. Lures *(see)* are reviewed elsewhere.

BAIT-AND-SWITCH

A saltwater angling tactic in which a trolled hookless teaser (usually an offshore lure or daisy chain) that has attracted a fish (usually a billfish) is quickly removed from the water while a hooked lure, bait, or fly is simultaneously presented. The substitute offering is usually one that—either because of its size or because of the light tackle being employed—could not be trolled at high speeds or would not create enough attraction to bring the fish in. The teaser does the work of bringing the fish close to the real lure. Bait-and-switch is used in particular with very light tackle, and for casting a lure or fly to a big-game fish.

See: Big-Game Tackle; Trolling Lures, Saltwater.

BAIT BUCKET

A round container to hold live bait; also, in saltwater, a term for a milk crate or chum pot *(see)* used for holding chum *(see)* in the water alongside the boat. Bait buckets may hold fish, frogs, crickets, eels, crayfish, or other items; large buckets used for containing baitfish may be equipped with portable aerators for oxygenating the water. For baitfish, common buckets are made of steel or plastic and have a perforated insert pail that contains the bait and can be easily removed to facilitate water changing; another common version is a floating plastic bucket with a spring-loaded door, which is kept in the water when the boat is at rest or when it is slowly trolled.

See: Bait Container.

BAITCASTING TACKLE

Baitcasting tackle is a type of light- to medium-light multipurpose fishing equipment characterized by a reel with a revolving spool that turns to dispense and retrieve line. The spool rotates like sewing thread, with the line moving perpendicular to the spool axis.

This equipment is related in general characteristics to conventional tackle *(see)*, which sports a larger revolving spool reel, has a greater ability to deal with strong fish, and holds more line. It is distinctive from spinning tackle *(see)* and spincasting tackle *(see)*, which both feature a stationary spool around which line is wound.

Baitcasting tackle ranks first in sales revenue in North America, where it is widely used, and third in sales volume (behind spincasting and spinning tackle), but it is not commonplace outside North America. Baitcasting reels are sometimes called levelwinds because all such reels have a feature that automatically distributes the line evenly across the spool as it is retrieved.

This tackle is not relegated to use with natural bait *(see)*, as its name implies; it can be used with natural bait and for trolling, but it is most likely to be employed in casting artificial lures. It can be used for light saltwater activity but is principally a freshwater fishing tool. It is especially popular in angling for largemouth bass and is widely used for most of the major species when fishing with heavier lures and terminal rigs.

Baitcasting reels predate spinning and spincasting reels. They were once notorious for being difficult to learn to use without incurring a backlash, or spool overrun, in which a bird's nest of line had to be painstakingly untangled. As a result, anglers flocked to the easier to use stationary spool products when they were introduced in the 1940s and 50s. Modern reels have greatly reduced this backlash problem. Meanwhile, the advantages of baitcasting tackle continue to be accurate lure placement in casting, superior cranking power, and control over strong-fighting fish.

Today, this equipment is vastly different, more angler-friendly, and compatible with diverse fishing methods. Appropriate baitcasting tackle may be used for virtually all fishing methods, including casting, trolling, and fishing with bait.

Reels

As a revolving spool product, the baitcasting reel has the same origins as the conventional revolving spool reel. The development of both has been intertwined since the nineteenth century. Baitcasting reels originated in Kentucky between 1800 and 1810, when a single-action revolving-spool reel (essentially a fly reel) was the only reel available for sportfishing, and anglers used only natural bait or artificial flies. The single-action reel was used to store and retrieve line and had no casting function. To present natural baits at any distance, anglers stripped an appropriate length of line off a single-action reel and either looped the line and laid it aside or coiled it in the noncasting hand. Using a wooden rod, they made a sideways motion to propel the bait and carry the stripped-off line. This was done because the bait and any weights used could not overcome the inertia of the single-action spool.

Between 1800 and 1810, George Snyder, a Kentucky watchmaker, and reputedly president of the Bourbon Angling Club, invented a reel with a delicate spool that would pay out line during the cast and that revolved several times for each turn of the crank handle. Thus was born the multiple-action reel, to be called the multiplier or multiplying reel, as well as a spool capable of dispensing line during a cast. The line of that day was raw silk, and there were no lures; for decades multiplying reels were small and because they were exclusively used for tossing natural baits, they were called baitcasting reels.

For most of the nineteenth century, such reels were made by hand. Various modifications and

improvements were made, including the addition of a mechanism to distribute line evenly on the spool (called levelwind), better gears, and the addition of external drag. What had developed as a tool for freshwater fishing, primarily for bass, became available in large sizes for situations where greater line capacity and mechanical strength was needed.

These reels were soon used for really powerful fish in saltwater. The lack of an internal drag mechanism, however, meant the fish didn't have to work for the line it took off. To offset this, anglers applied pressure to the reel spool with their thumbs (which was ineffective for large fish and sometimes painful to the angler) or with a leather thumb pad attached to the reel frame.

William C. Boschen, a member of the legendary Catalina Tuna Club of California, is credited with originating the concept of the first internal star drag on revolving spool reels, a handy threaded knob adjustment that internally regulated spool pressure. A prototype of a reel with such a device was reportedly made for Boschen by Brooklyn, New York, reel manufacturer Julius Vom Hofe. Boschen used it to catch the first broadbill swordfish (358 pounds) ever taken on sporting rod and reel. That catch was made in the summer of 1913 off Catalina Island Later versions of this reel were named B-Ocean.

This product was the predecessor of modern revolving-spool reels. The star drag mechanism provided an internal friction adjustment mechanism, or brake, that provided greater resistance against strong fish and slowed the rate of line being pulled off the reel. This mechanism was incorporated in all types and sizes of revolving-spool reels in later years. Today all conventional or baitcasting reels feature a star drag. A baitcasting reel is essentially a small revolving-spool reel with a levelwind line-guiding mechanism and star-spoked wheel drag adjustment.

The largest baitcasting reel is about the size of the smallest conventional reel. Most modern baitcasting reels are used primarily for cast-and-retrieve angling (with lures rather than natural bait) and are likely to be fished with heavier lures and weights than spinning or spincasting reels. They're all suitable for casting, but the larger models are not comfortable for continuous casting. Some light models, however, are used with very light lines and lures, some heavier and large-capacity models are used in very demanding situations, and trolling and baitfishing are eminently feasible in addition to casting.

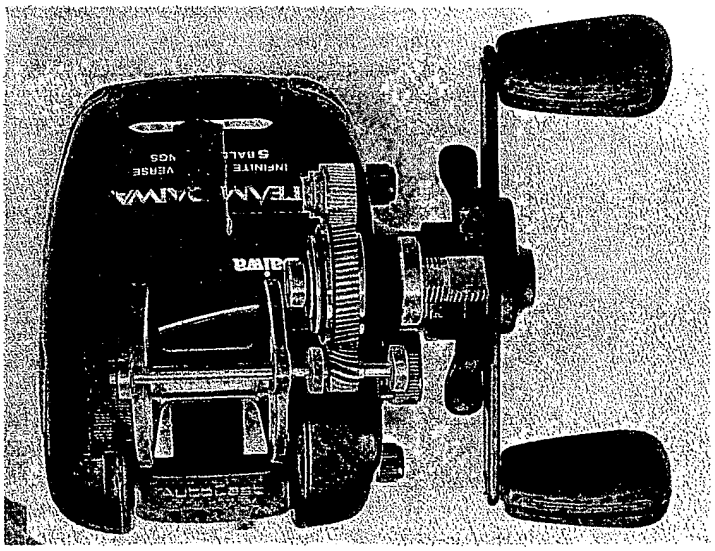
Gears, cast control, and drag are the most critical components of baitcasting reels. The cast control and gears are especially important because they significantly affect casting and retrieving functions. The main problem with a baitcasting reel is that, when casting, it is tough for the user to control the movement of the spool making it difficult to avoid a backlash. When control is mastered, however, the angler can be extremely accurate when casting with this equipment. Gears are of special concern when it comes to line recovery and cranking power. Many baitcasting reel users seldom use the drag feature; others, use it only occasionally, but when they do use it, it is important to them. Drag tension is not easily or readily adjustable to known levels, however, during the fight of an especially strong fish, a weakness that is seldom a problem for anglers who know how to use their tackle well.

General Operation

Baitcasting tackle basically works like all tackle except flycasting: A weighted object at the end of the line pulls line from the spool. The spool of a baitcasting reel revolves as line pays out during the cast and as it is retrieved when the handle is turned. When the gears are disengaged and line is dispensed from the reel, a backlash, or spool overrun, can occur when the revolving spool turns faster than the line is leaving the spool. Applying light pressure to the spool can prevent this.

The baitcasting reel has a spool release clutch in the form of a button or bar that activates or deactivates the gears; this takes the reel into or out of freespool. With the reel on top of the rod handle and facing toward the angler, the rod-holding hand's thumb is placed on the spool to keep the line in check, and the free hand is used to depress the spool release, which disengages the gears and puts the reel in freespool. When thumb pressure is relaxed, line flows off the spool and out through the rod guides, carried by the weight of the object at the end of the line.

A few baitcasting reels (wide-spool versions) feature a click ratchet that signals when line is being taken off the reel; this can be used when a reel is not handheld or when it is left unattended. To retrieve line, the gears are engaged by turning the handle forward, which winds line onto the reel. A levelwind mechanism automatically distributes it back and forth across the spool.



The components of a Daiwa baitcasting reel and their interrelationship are evident in this composite image.

B

Every baitcasting reel has an adjustable drag mechanism, which is activated by turning a star wheel on the drive gear. This is located on the sideplate under the handle. The drag tension is set to the desirable level at the beginning of each day's fishing and relaxed at the end of the day.

These are the basic elements of operating a baitcasting reel. Some models have cast control and anti-reverse features; the size of the spool, the materials used, and the designed application of each product are also relevant.

Casting/Line Release Features

Controlling the flow of line off the spool is an important and basic element of use in all baitcasting reels and in all means of fishing.

Freespool. Disengaging the gears of a revolving spool reel so that its spool can freely turn backward and dispense line is known as putting the reel into freespool. When using a baitcasting reel, the angler simply depresses the line release clutch, which is also known as the freespool switch and is in the form of a button or bar. When the clutch is depressed, the pinion gear is disengaged from the spindle, which it drives. The reel is then in freespool; the gears are still intact but not the drive mechanism.

To permit quick, one-handed operation, the clutch is conveniently placed on the front (facing the angler) of most reels. This may be a contoured bar over the spool that bridges the sidewalls, or a switch that is recessed in the sidewall and permits the thumb to slide onto the spool. On some new reels and many older ones, the clutch is a button that is located away from the spool; you hold the reel in one hand and use your noncasting hand to depress the button.

A clutch bar (also called a thumb bar) is generally more convenient than a recessed switch. A bar gives you constant control of the spool because the tip of your thumb is on the spool while the heel of your thumb pushes the bar down. As long as the bar is properly situated, you only have a slight chance of accidentally hitting it and inadvertently putting the reel into freespool, which could result in disaster while playing a hard-fighting fish. (Incidentally, baitcasting reel manufacturers report that premature engagement of the clutch while the spool is still rotating at high speed during a cast is the single most damaging action to these reels.) A large-capacity reel that might be used for big fish and for trolling more often than for casting, and one where you might apply thumb pressure as extra drag, is better suited, however, to a side button.

When you depress the clutch of some reels, the levelwind line guide moves back and forth as line goes out. Others have a curtain line guide made of two bars that separate; this is no longer common, as it is prone to malfunction. The line guide of most reels remains in position until the handle is turned.

Spool revolution. When putting the reel into freespool, you must apply finger pressure to the spool to prevent line from paying out prematurely or haphazardly. Without this pressure, and assuming that a lure or weighted bait is tied to the end of the line, the weight at the end of the line would cause the spool to turn the moment the reel was placed into the freespool position, which could cause an instant backlash on the spool.

It is therefore necessary to place the thumb of the rod-holding hand on the spool so the spool can't turn; this is done instantaneously when the reel has a thumb bar or recessed switch because the thumb of the casting hand contacts the spool as it depresses this clutch. You must use both hands if the reel has a clutch button, keeping the thumb of the noncasting hand on the spool while you press the button with your other hand. The line can then be released by easing the tension or, in some instances by casting.

Spool braking/control. When releasing line without casting, thumb pressure is lessened on the spool to pay line out at a controlled rate; the objective is to let out the desired amount of line at a rate that doesn't make the spool turn so fast that it causes a backlash. This is important because a revolving spool can gather speed quickly and an uncontrolled spool can lead to a serious backlash in an instant. The backlash not only impedes immediate fishing effort because of the time required to undo it, but can also cause damage to the line.

This situation becomes even more acute when you use the reel for casting because the activity of casting builds up greater spool speed (spool speed in casting has been measured as high as 20,000 rpms). Casting requires very precise control of the revolving spool. In either application, it is necessary to brake the spool to slow its speed. The three means of controlling the spool when line is flowing off the reel during casting are mechanical, magnetic, and manual.

Manual spool braking is done by applying thumb pressure to the moving spool when casting. This is an action learned through trial and error and perfected with experience; it requires the application of different degrees of braking tension, depending on the weights on the line, distances being cast, and types of rods and reels being used. Although you can learn to use a baitcasting reel without applying thumb pressure, you cannot fish without some manual control at the time and with all reels, so it is something you must learn.

Mechanical spool braking is done by using centrifugal brakes (also called weights) to apply pressure to the moving spool. Reels with centrifugal brakes have blocks that must be engaged to effect spool braking. These blocks are usually found on the left side of the reel. They are accessed on some reels by removing the entire sideplate and on others by unlocking a quick-release bayonet cov

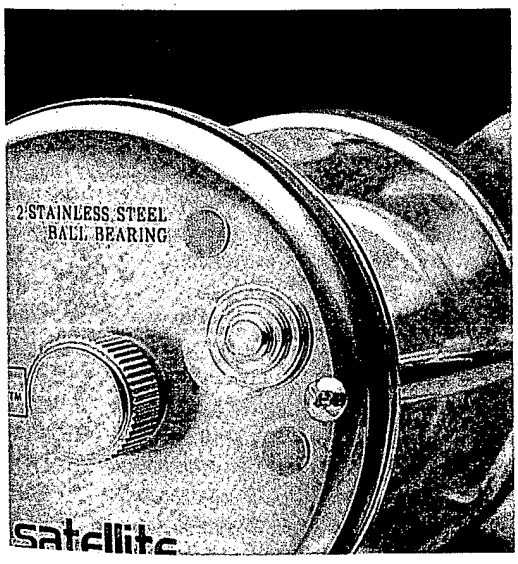
On the spindle of the spool is a cross pin with a centrifugal brake block on either side (some reels have a wheel-spoke system with four to six brake blocks). To be employed, these brake blocks must be moved out toward the spool flange and snapped into a notch. In this position they rub against the flange and apply centrifugal pressure to slow the spool and help avoid a backlash. The harder you cast (greater spool rpms), the harder the brakes work.

The centrifugal braking system varies with different products and manufacturers. Accessing this area is easy with most reels. Read the instructions that come with the product because some are supplied new with the brakes in the off position and some with the brakes in the on position.

These centrifugal brakes are used in conjunction with operating the spool tension knob. This device is a knurled knob or bearing cap on the sideplate where the handle is located, and it is adjusted by hand. Tightening this device puts tension on the spindle of the spool, but it is not purely a spool-braking device, as many people think. Its purpose is to control excessive end play, or sideways movement, of the spool, and its value in controlling spool braking is limited.

If the spool tension on a reel is too loose, there will be too much movement in the spool, and line could get behind it. If the engineering mechanics of a reel are correct, line should not get behind the spool; you should be able to loosen the spool tension knob completely and, although there will be excessive end play, you will not be able to pull the flange of the spool out of the centering ring of the sideplate.

As the spool tension knob on baitcasting reels is tightened, an interior wear plate rubs against the spool spindle. Tightening is usually accomplished in a clockwise motion, and the knob should be adjusted so that there is barely any perceptible sideways motion of the spool. Place your thumb on the middle of the spool and move it back and forth to see if you can move the spool. For general use, adjust the spool tension to a tight but not immovable tolerance.



The sideplate of this Marado baitcasting reel shows the spool tension control knob and the switch for a click ratchet, the latter being found on only a minority of such reels.

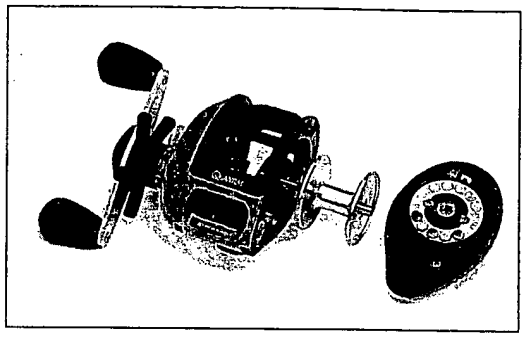
Spool tension needs to be adjusted according to the weight of the object being cast; in theory, if you switch frequently to lures of different weights, you should reset the tension each time. To do this when the reel is on the rod with line attached to a lure, hold the rod out and dangle a lure from the tip, place your thumb on the spool, and put the reel into freespool. Decrease thumb pressure and allow the lure to fall. Adjust the spool tension knob so the lure slowly descends to the ground when thumb pressure is relaxed. The spool should stop revolving at the instant the lure hits the ground. For continued long-distance casting, you may want to decrease spool tension and (if your thumb is well educated) put the centrifugal brake blocks in the off position.

Experienced casters tighten or loosen the adjustment knob, and employ this level of control in conjunction with an educated thumb. Newcomers to a baitcasting reel should start with a tighter adjustment at the outset to provide some assistance with spool braking, or they will be picking backlashes out with every cast. This tension can be gradually lightened as you become more proficient with thumb control.

Magnetic spool braking is a completely different system. It is common on the majority of reels from many manufacturers. Magnetic spool braking systems use a magnetic field to place variable degrees of force on the spool. A series of small disklike magnets are located in the interior of the sideplate opposite the handle. When an exterior magnetic control knob is turned, it changes the distance of the magnets from the metal spool; when the magnets are closer, more force is applied, and when they are more distant, less force is applied. Lower settings enable longer distance casts; higher settings help prevent backlash under adverse conditions, such as when casting into the wind.

While these systems are touted as "eliminating backlash," they are not foolproof, and if magnetic spool braking reels aren't used correctly, they will still backlash. They are, however, excellent for those who are learning to cast with this equipment when the proper settings are selected. Beginners should use a higher tension setting when they start; this will cut down on the distance achieved, but it is better to cast a shorter distance at first than to be frustrated by backlashes. With a little practice you can ease off on the tension and keep learning until you become comfortable with less tension.

Some of the newest magnetic spool control systems are very sophisticated and have the ability to alter magnetic force according to the speed of the



Removing the sideplate of this Zebco Quantum baitcasting reel allows spool changing and reveals the spool control magnets.

spool during the cast. This is different from most systems and is significant because spool speeds vary from extremely high rpms at the outset to lower rpms near the end of the cast. Variable-force magnetic systems automatically apply pressure according to the speed of the spool, which is essentially what an educated thumb is supposed to do. This type of system actually allows a spool to maintain its speed longer, meaning that it will result in longer casts. While a longer cast sounds good, the best benefit of this system is avoiding backlash without sacrificing accuracy. Thus, with some practice and experience, and with proper setting of the magnetic spool control on better reels with a variable magnetic control system, it is possible, strictly by using the magnetic control, to cast without having a backlash.

It should be noted, however, that no matter how sophisticated these magnetic anti-backlash systems are, many expert anglers are very comfortable with, and continue to use, baitcasting reels without this feature. The late 1990s saw a resurgence in high-end premium baitcasting reels, very few of which had a magnetic spool control feature. If you only use a baitcasting reel for noncasting activities, you don't need magnetic spool braking; most saltwater anglers who use baitcasting tackle do not use reels with magnetic controls because of the likelihood of corrosion.

Incidentally, baitcasting reels usually do not have both centrifugal and magnetic cast control systems. It's one or the other. In both systems, however, you still use the spool tension adjustment in conjunction with the centrifugal or magnetic spool braking.

To set up a reel with magnetic spool control for casting, begin by adjusting the spool tension knob as previously detailed, starting with the magnetic control at the lowest setting. Once the mechanical tension knob is adjusted, turn the magnetic setting from zero to an appropriate level, make a few medium-intensity casts, and adjust the magnetic control up or down as necessary before you start serious casting. Slight thumb pressure on the spool is advisable when starting with low magnetic control, but you can apply less pressure than you would if using only mechanical braking. Complete beginners should set the magnets at maximum level until they get proficient at releasing the lure and applying thumb pressure.

A more detailed explanation of the entire backlash issue, especially the phenomenon that causes it, is contained later in this entry.

Flipping feature. Many baitcasting reels have a selectable switch that automatically engages the pinion. This is known as the flipping switch because it is primarily used in this method of bass fishing, which requires specialized short-distance casts *(see: flipping)*. It can also be employed, however, by anglers who use bait and need to let a fish run when it takes the bait offering.

With this switch on, the reel is out of gear only when the thumb is kept on the freespool bar. When you release thumb pressure, the reel is instantly in gear. The advantage is that you don't have to turn the handle to put the reel in gear. Because the reel is already in gear when a fish takes or when the line tightens, no time is wasted setting the hook. The kind of fishing and the techniques you use really determine whether this feature is necessary.

Retrieving/Line Recovery Features

Line pickup. To be in a position to set the hook and to return line to the spool, some drag tension must be established and the gears must be engaged. Line is retrieved by rotating the handle, which drops the pinion gear onto the spindle and engages the drive mechanism. As long as there is some drag tension in effect, turning the handle will revolve the spool, bringing line onto it.

Left/right retrieve. The great majority of baitcasting reels are set up only for right-handed retrieve and are not convertible. Although right- and left-handed anglers have been using this system for many decades, it favors the minority of people who are left-handed. A few reels are available with left-handed retrieve, but these are not nearly as accepted in the marketplace as right-retrieve reels.

Despite the fact that right-handed anglers have become accustomed to fishing backward with baitcasting reels, it is theoretically beneficial for people who are right-handed to reel with their left hand and for lefties to reel with their right hand, so that the dominant hand is the one that holds the rod and is used to play the fish or direct the retrieve. This is especially significant when frequent casting is involved, as is usually the case with baitcasting tackle. The dominant hand is used to cast the rod, so there is no need after casting to take further action to start using the reel; the other hand is immediately placed on the reel handle grip and turns the handle. This lack of time delay is important in some fishing situations.

Making a well-executed cast and getting the lure precisely on target, for example, is often not the end of the casting action. When angling in some places and using lures that sink, you have to be able to start

fishing them the instant they hit the water, or they'll get tangled or snagged on objects in the water. A spinnerbait worked very shallow is an example of a lure that should "hit the ground running."

Left-handed baitcasters who retrieve with their right hand and right-handed baitcasters who retrieve with their left hand will have little trouble if they thumb the spool properly and get cranking the instant the lure touches down. Such anglers are in the minority, though; most users both cast with their right hand and retrieve with their right hand, meaning that they switch the rod and reel from right to left hand at some point.

Most good casters become adept at making this transfer while the lure is in flight, taking their right thumb off the spool just as the lure touches the water and then quickly grabbing the reel handle and cranking before the lure has a chance to get deep. This takes fine timing and is an oft-overlooked aspect of baitcasting technique. You must master this (or learn to cast with your other hand) in order to effect the best possible retrieve under certain circumstances.

As mentioned, there are some left-retrieve baitcasting reels. Most of these are flip-flopped copies of right-retrieve reels, although at least one company has recently produced a distinctive left-retrieve reel that has a rearward handle (instead of forward on all other reels) and a top-mounted line release that are meant to reduce the awkwardness of right-handed casting and left-handed reeling.

If you are new to baitcasting and are right-handed, you should consider getting a left-retrieve reel because you don't have old habits to break. If you're already accustomed to casting a spinning outfit with your right hand and reeling with the left, this is the same principle. Many new right-handed baitcasters have found it worthwhile to start out with a left-retrieve reel and continue with it (left-handed anglers can simply use the many standard right-retrieve reels).

Many experienced right-handed baitcasting users, who are already used to reeling right-handed, have found it difficult to make the transition to left-retrieve reels, however, especially when fishing with various outfits during a day. From a practical usage standpoint, owning both right- and left-retrieve baitcasting reels becomes more gear-intensive than most people like or can afford. The obvious answer is a convertible reel, but none are presently available.

Line winding/levelwind. Line is wound directly onto the spool of a baitcasting reel, but it is not necessary to manually level or disperse that line across the spool. All baitcasting reels have a mechanism known as a levelwind that automatically disperses line evenly across the spool. The levelwind may be gear-driven by the spool or by the main gear; it turns whenever the spool revolves, both forward and backward. It is located in a carriage that spans both sides of the reel. Inside is a nylon idler gear that turns a worm gear and catches a pawl that moves the line guide back and forth across the spool to distribute the line evenly, which helps eliminate line buildup.

Most winding lays line on the spool evenly in side-by-side wraps, but some reels use a cross-wrapping wind. The cross wrap helps with some lines, especially slick thin-diameter microfilaments, which have a tendency to dig deep into side-by-side wraps when subjected to severe tension.

Virtually all mass-produced baitcasting reels have featured a levelwind mechanism for many years. Only competitive tournament casters are likely to have a small revolving-spool reel without a levelwind, and that for distance events.

This brings up an interesting issue. The levelwind line guide contacts the line when it is cast and when it is recovered. Although a levelwind has great merit for constant cast-and-retrieve fishing, it has some drawbacks that most people do not realize. One of these is that it reduces casting distance. The reduction may be slight for the average angler, and is compensated for by the use of less resisting materials on the line guide. Levelwind line guides are made from many different materials. Some, and especially the old standards and large-spool models, have a long open metal guide; in others, the guide opening is narrow and made of ceramic, titanium, or aluminum oxide.

Line speeding off the spool on a cast contacts the spool by one of several methods. On a few baitcasting reels, the levelwind guide moves freely back and forth in its carriage when the line is outgoing (high friction); this is preferable to others where it does not move at all when line is outgoing or moves to a center position and stays there (both of which cause more friction when line comes off the edges of the spool).

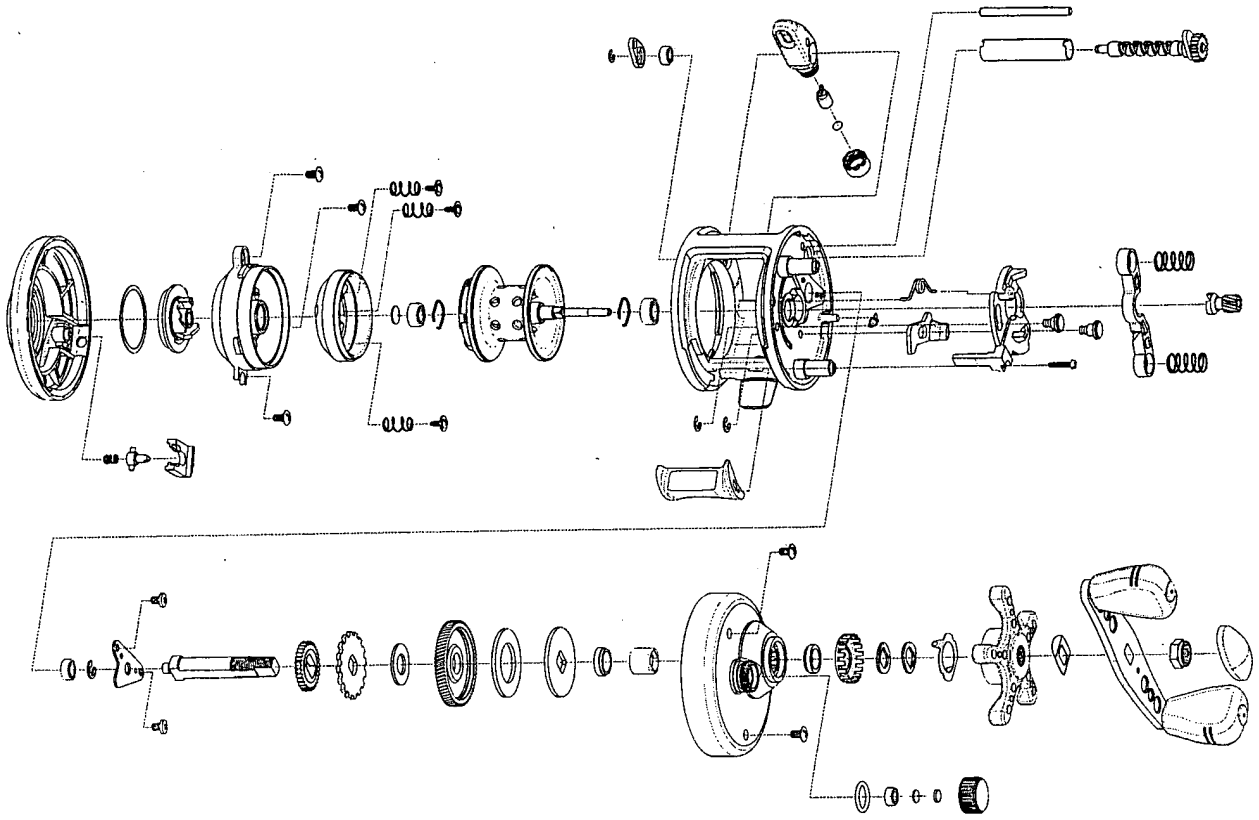
The other drawback is that the carriage is prone to getting grit, dirt, and sand in it, which can hamper smooth use or cause the carriage to malfunction. Many saltwater anglers are skeptical of the levelwind and view it as a likely problem, if not because of sand then because of corrosion. Proper care and washdown of a reel should minimize this problem in good quality reels.

Gears. The most basic part of the operation of every reel is the gear set. In baitcasting reels, this is generally stronger and more efficient than that of a stationary or fixed-spool reel because the gear set operates on a parallel axis.

In a baitcasting reel, a large gear, the main or drive gear, engages a smaller gear, the pinion. The drive gear is linked to the reel handle, and the pinion gear connects to the spool. This system provides the multiplying gear ratio for ample line retrieval rates with a small spool and still delivers substantial cranking power. It also allows for the use of heavy lines.

Most baitcasting reels have pinion and main gears that are made from the same material, such as

In March of 1882, an estimated 1.4 billion tilefish were found dead on the Atlantic Ocean surface, covering an area 25 miles wide and 170 miles long.



Shown are all the parts of a Quantum baitcasting reel, which includes a one-piece aluminum frame, centrifugal brake, three ball bearings, and continuous anti-reverse.

a hard brass. Some of the better quality baitcasting reels have dissimilar materials, such as a bronze pinion and a brass main gear. Very few have a stainless steel pinion gear and a bronze main gear (which is common on conventional reels). Unless one gear is slightly softer than the other, problems can arise.

In almost any simple gear set, one gear material should be different from the other. Use of the same materials tends to cold weld, or "gall" together; dissimilar metals nearly always offer the lowest coefficient of friction. The presence of an oil film helps to reduce friction. Use of dissimilar metals and an oil film ensures that gears run smoothly for a longer period of time.

The best situation is for the main drive gear material to be slightly softer than the pinion gear for wear characteristics, especially in reels that are used often for demanding applications, and where the gear ratio is high. In a multiplier reel (such as a baitcasting or conventional reel), one tooth of the pinion gear contacts its mating teeth on the main gear the same number of times as the gear ratio. That is, in a 5:1 ratio reel, each tooth on the pinion gear is activated five times more often than its counterpart on the main gear. Therefore, it is subject to five times the wear and needs to be harder simply to survive. Use of harder materials on the pinion gears produces a hardness differential that favors the smaller diameter pinion gear and provides longer life.

Gears are made to work in a given way with respect to each other, so there must be a certain distance between the two to match up; otherwise the gears will feel tight. Naturally, the gear teeth must be machined as precisely as possible to assure smooth operation and long life. Some reels, especially those with a higher gear ratio, have helically milled gears. This means that each gear tooth is spiral or curved, rather than straight, on the gear circumference. Helical milling results in increased contact area, greater strength, a thicker cross section, and a high degree of inherent smoothness, particularly for smaller gear teeth. The major benefit is that, unlike straight-milled gears where only a single gear tooth is fully engaged at one time, helical gears allow at least partial engagement of several gear teeth at all times, spreading the load and potential wear. This is mainly an issue where the gear teeth are small, as is found on higher ratio models, and there is less surface to make contact.

The high-stress cranking that is experienced when using baitcasting reels with some methods of fishing (such as using hard-pulling lures and landing strong fish), requires a rigid support system, so that under great duress there is no flex to affect the inner workings of the reel. The use of heavy line, and cranking large fish in extreme conditions, can put tremendous stress on all components. Both the material and construction of the frame and shaft

supports are what keep the gears precisely located and delivering long life.

Gear ratio. Because the drive gear is linked to the reel handle and the pinion gear is engaged with the spool, the basic numerical ratio of the drive and pinion gears in a baitcasting reel merely establishes the number of revolutions made by the spool per turn of the handle. That number is determined by counting the gear teeth on the larger drive gear and dividing that by the tooth count of the smaller pinion gear. In a gear set consisting of a 53-tooth drive gear and a 10-tooth pinion gear, the ratio is calculated at 5.3:1, because the pinion will turn 5.3 times for each full rotation of the drive gear.

Gear ratios are generally categorized as high (fast) or low (slow), but this is relative to the type of reel and application. Furthermore, the size of the spool may be such that a low gear ratio reel actually recovers more line per full turn of the handle than a high ratio reel with a smaller spool. Typical low gear ratios for a baitcasting reel are about 3.8:1, and typical high gear ratios are from 6:1 to 7:1; most high gear ratio baitcasting reels are between 6:1 and 6.3:1. If numerical ratio were the only factor of comparison, what is low or somewhat low for many baitcasting reels would be high for nearly all conventional reels. In a baitcasting reel, a high gear ratio may be preferable for cast-and-retrieve fishing with lures that do not pull hard, but a low (or at least lower) gear ratio reel is preferable for hard-pulling lures. What is gained in retrieve speed is lost in cranking power.

The higher the ratio, the greater the potential for stripping gears under severe strain. On a high gear ratio reel, the individual teeth become narrower because more teeth are fitted into a given area and they are weaker. An inexperienced angler is more likely to do damage on a high gear ratio reel when he puts the smaller gear teeth under a heavy load. Fishing with a high gear ratio reel requires using the rod a lot, pulling it back and then winding line onto the spool quickly on the downstroke. This is necessary because, with high gear ratio reels, the smaller tooth configuration does not have sufficient cranking strength. This is a factor in all reels but obviously of more concern with reels that get a heavy load.

Cranking power. Gear ratio and cranking power are inextricably linked in all reels, and most affect how easy or difficult it is to retrieve a heavy weight or an object that offers a lot of resistance. Reels that can easily handle a heavy load are said to have a lot of cranking power. There are various factors that affect this.

The length of the handle has a bearing because length is a factor in the amount of leverage you can put on the handle. The longer the handle, the more leverage, and the easier it is to retrieve a set load. If you make a handle longer, you reduce the force at the knob. It is essentially the same principle as having a long-handled wrench; it's easier to loosen nuts with a long-handled wrench than with a short-handled one. So a longer handle equates to greater power (although your hand and arm must describe a larger circle to operate the reel).

The gear set itself is also a big factor with regard to cranking power. If you have a baitcasting reel with a gear ratio of 3.8:1, then it's easier to retrieve a load because this is a low gear ratio. If you have a baitcasting reel with a gear ratio of 6.2:1, which is high, it's much more difficult to retrieve a load, although you get more speed. If you're retrieving something that offers very little resistance, the high gear ratio is okay. You need a lower gear ratio, however, for something that offers more resistance. Thus, the lowest gear ratio reels have the greatest cranking power, and the highest gear ratio reels have the least cranking power.

Naturally, there are times when you want the best of both extremes. Some baitcasting reels have two-speed operation: in essence, the ability to switch between a higher and a lower gear ratio. In these two-speed baitcasting reels, gears are changed by moving a knob or lever. Most people who use these wind up doing nearly all of their fishing with the high-speed mode (6:1) because the low speed (3.5:1) is just too slow for retrieving most lures.

Regardless of the gear ratio, the evaluation of a reel's ability to retrieve line should boil down to something engineers call Inches Per Turn of the handle, or IPT. This is the amount of line recovered per turn of the handle or, simply, line recovery, which is a better measurement of retrieval ability than gear ratio. Line recovery is determined by spool diameter, which is a key dimension for any reel and which sets the circumference of the line level on the spool and the amount of line wound onto the spool with each turn of the reel handle.

When the level of line on a spool is low, as it might be when a strong fish takes a lot of line, less line is recovered per turn of the handle than it would be when all of the line is on the spool. Similarly, the amount of line recovered per turn of the handle of a fully spooled 4:1 ratio reel that has a small spool is less than the amount of line recovered per turn of the handle of a fully spooled 4:1 ratio reel that has a large spool.

Thus, the amount of line recovered is the measurement an angler should be most interested in. Yet anglers cannot quickly determine line recovery when evaluating a reel they might purchase because specifications on the circumference of the spool are seldom provided on the reel or in the packaging materials. You may know, for example, that in a 4:1 ratio reel one revolution of the handle puts four wraps of line on the spool, but if you don't know how much line is gained with each complete wrap, you don't know the actual recovery. (In a reel that you own, of course, this can be determined by marking the line and then measuring it.)

For a greater discussion of this subject, *(see: gear ratio)*. Although most people have a notion that

Wild freshwater fish with low levels of fat and calories include yellow perch, walleye, pickerel, and crappie; high levels belong to chinook salmon, rainbow trout, and lake trout.

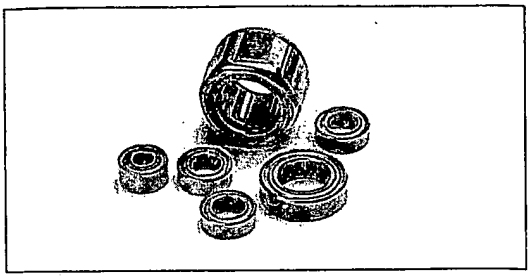
gear ratio is of primary importance in retrieval and some think that the higher the ratio the better, other factors are involved, and line recovery is a major one. Remember, however, that reels with a low gear ratio do better under heavier loads, whether those loads are due to the size of the fish or the type of equipment being used (heavy weights, deep-diving lures, and so on).

This issue is most critical in baitcasting reels that are used in hard or heavy duty applications. Chances are, the bigger the reel the more likely it is that a heavy load will be placed on it. The larger the reel, the more noticeable the effect of a high gear ratio, so you'll feel that load a lot more.

Handle. The length of the handle affects cranking power, so the distance from the center of the gear stud to which the handle is attached to the handle knob is a key element in retrieval. A long handle equals power, yet many people have the misconception that a long handle also equals speed—that the longer the handle, the faster it can travel. The opposite is true. The longer the handle, the greater distance the cranking hand must travel with each turn. The shorter the handle, the quicker it can be turned, but there's less power, so there's a trade-off either way. You can't get power and speed simultaneously. All baitcasting reels have dual-grip handles, which provide a counterbalancing effect and easy grabbing of the handle without having to look at it. A baitcasting reel grip or knob is mainly grasped with the fingertips and operated by wrist motion, and is not affected by the presence of a second handle knob. There are various styles of grips. Most have a contoured, textured, paddlelike surface with grooves, which is quite comfortable; many are round, which is traditional. The size of the knobs and the handle is often a problem for many people who have long fingers and large hands. The smaller baitcasting reels seem designed for small hands and are not comfortable in a large hand when used for a considerable period of time.

Ball bearings/bushings. Bearings and bushings provide a way to minimize friction on rotating shafts. Bushings don't spin as freely as ball or roller bearings, which are typically viewed as durable and reliable and a way to add rotational freeness to the retrieval system. A bushing can deliver as smooth a retrieve as a ball bearing under low load conditions, but under heavy loads, ball bearings are vastly smoother and more durable.

One to four stainless steel ball bearings are used on many baitcasting reels, primarily on both ends of the spool shaft and on the crankshaft. Some reels have only one ball bearing and a bushing on the end of the spool shaft. It is possible to have up to 11 ball bearings in a reel, including one on the cap area of the shaft, one on each end of the worm gear, and two on each handle knob. They are unnecessary in most of these places, however, and drive the cost of the reel up; the most that baitcasting reels have is six or seven ball bearings. The most noticeable value



Six stainless steel ball and roller bearings from a premium baitcasting reel.

of ball bearings is the smooth operation of the spool. Ball bearings are, or should be, of the highest grade to provide the most benefits. For a more detailed review of ball bearings and bushings, *see: Reel, Fishing.*

Warning click. Known simply as a click or clicker, this is a ratchet device that is primarily intended to let an angler know that line is going out. It is only found on a small number of baitcasting reels, usually the larger wide-spooled models.

The warning click is generally used when a rod and reel have been placed in a rod holder (for instance, when trolling or baitfishing) and is not handheld. In some situations, as when fishing with bait, the reel is placed in freespool with the warning click on so that, if a fish picks up the bait, the line is free to move with minimal resistance yet without risking a spool overrun. In other situations, such as when trolling, the gears are engaged and the warning click is employed so that it instantly alerts an angler (or mate or boat captain) to a strike and to the fact that a fish is on and taking line off the reel.

The click itself features a spring-loaded tongue that moves back and forth against ratchet teeth to make this sound. It is activated by moving a small off-center button on the sideplate (usually the left sideplate). The click is intended for part-time rather than full-time use, and the click button should be disengaged when retrieving. Continued use of the click causes premature ratchet wear. Some people view leaving it on as a sign of an inexperienced angler, although some charter captains like it to be left on because the sound lets them know what a customer's fish is doing; when the clicking sound speeds up, for example, the fish is taking line. Some captains have even asked manufacturers for different types of sounds in the click. (This is especially prevalent in the Great Lakes, where the clicks are always used for trolling.)

Drag Features

The purpose of the drag function on any reel is to let line slip from the reel at varying pressures when force is applied to the line. It serves as a sort of clutch, or shock absorber, and is especially important when using light line, when playing large and strong species, and when fish make strong and sudden surges while being landed. If an angler never catches large fish, only uses heavy strength line, and

is content to wind fish in, then it is conceivable that the drag will never be used.

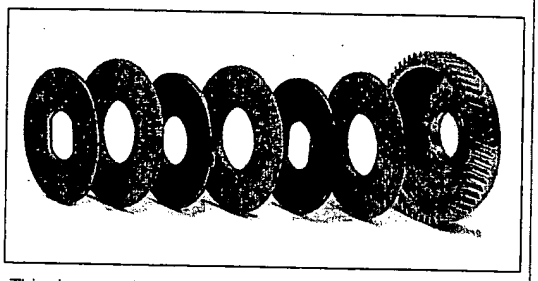
Many people who use baitcasting tackle do not use the drag very often. Many bass anglers, who are major users of this tackle, seldom use the drag, or they tighten it down so that they cannot use it. This is not a good idea, however, as it defeats the purpose of this feature altogether. Those who do use the drag on baitcasting reels are anglers who generally fish with lighter strength line; those who catch big steelhead, salmon, catfish, pike, muskies, and stripers; and those who use baitcasting tackle for various saltwater species.

Catching large fish, which weigh more than the actual breaking strength of the line or that can apply extreme pressure on the tackle, requires some finesse rather than sheer strength. This means that the drag will come into play because if it doesn't, the force will exceed the strength of the line and the line will break.

When the drag comes into play, it allows the fish to continue applying force but at a pressure that is less than the breaking strength of the line. When the force reaches a certain level (usually a specific percentage of the line's breaking strength), a properly set drag mechanism turns the spool and allows line to slip from the reel under tension. In essence, this means that a fish can run instead of engage in a tug of war. The fish must work for the line it takes off the reel, however, which tires the fish and helps the angler subdue it.

Many people mistakenly think that they need to set the drag very tight for effective hook setting. When you have 20 yards of line out, and you have rod flex, line stretch, and the dampening effect of the water to contend with, you don't need very much drag force at the reel. You cannot exert the maximum pressure when you set the hook. When you set the drag pressure at or near maximum force, once the fish is close to the boat and less contribution is made by line stretch, rod flex, and water, having the drag locked down may mean that the line cannot absorb the sudden shock of a quick run, even from a fish whose weight is less than the breaking strength of the line. People are often amazed that a 15-pound fish can break 20-pound line, but that doesn't happen if the drag is set properly and the washers are allowed to slip freely when necessary.

In typical fishing with baitcasting reels, anglers set the drag at 25 to 30 percent of the breaking strength of their line. Some people measure this with a short length of line on a straight pull off the reel. Others measure it with line running through the rod guides and the rod flexed as it would be in fishing circumstances. Most people use the "feels good" method of establishing drag tension by pulling line off the reel and adjusting the star wheel until the tension feels right. The most precise way to measure drag tension is by using a reliable scale and attaching it to the line. No matter what method is used, the objective is to adjust the drag so that the line will not slip until the appropriate amount of tension is applied. Understanding how to use and set drag is one of the most important aspects of sportfishing; it is thoroughly reviewed in detail elsewhere *(see: conventional tackle; drag)*, so that information will not be repeated here.



This drag stack from a top-quality baitcasting reel has three friction washers interspersed between three metal washers, the latter keyed into the main gear and gear stud.

It should be noted, however, that on baitcasting reels the drag is located on the main gear and is usually a multi-element system with washers that are keyed together to increase the working surface area. Different materials are used in the friction washers; a popular one in some better reels now is graphite-impregnated Teflon. Drag tension is increased or decreased by turning a drag star (radial-arm star wheel), which is located under the handle on the sideplate. The drag star threads onto the gear stud or drive gear, which is connected to the handle, so it rotates concurrently with the handle without affecting the setting.

Turning the drag star clockwise or forward increases tension; turning it counterclockwise or backward decreases tension. When spool friction exceeds the tension on the line, the reel handle turns the main gear and the spool, and allows line to be recovered. When tension on the line exceeds friction on the spool, the spool revolves against handle pressure, and line can be pulled off the spool. The handle is prevented from turning backward by a dog and ratchet, which is known as an anti-reverse.

This system eliminates the possibility of line twist due to turning the handle when line is flowing off the spool, which is a major contributor to severe line twist in fixed-spool reels. On a baitcasting reel, twist isn't possible if you're cranking the reel handle and the drag is slipping at the same time. There is no line twist unless it comes from the lure use or you put it on when the spool is filled.

The range of drag tension adjustment is somewhat more limited on baitcasting reels than spinning reels, although it looks like more because of the star wheel knob. With these products, it is often the case that a smooth drag and the ability to fully lock down the reel (so the spool cannot turn backward) are not compatible, although better baitcasting reels do have good drag systems with a wide range of adjustment.

B

Anti-Reverse Features

The anti-reverse component of reels is an element that restricts backward movement of the handle. In most baitcasting reels a dog and ratchet mechanism provides a variable amount of backward handle movement; this is a multi-stop anti-reverse. The amount of this movement is decided by the number of ratchets for the dog to catch. In some reels it is a one-way roller bearing that allows no backward movement and which is called continuous or infinite anti-reverse.

This feature is especially relevant to cast-and-retrieve applications and to some styles of bait-fishing, primarily because it is relative to how the reel operates when the forward-turning motion is stopped. There is a natural tendency to pull up on the handle when not reeling, whether to set the hook or to momentarily stop while retrieving. If there is considerable play in the handle and drive gear when the reel stops, the handle may actually turn backward slightly. This produces a feeling of sloppiness or instability, and too much backward movement of the handle may adversely affect hook-setting. Ideally, a reel used for casting should engage instantly and firmly. Many of the better baitcasting reels have a continuous anti-reverse that keeps the handle and drive gear from moving even the slightest bit backward..

The number of ratchets in the system is one factor that governs how quickly the drive gear engages in a reel with multi-stop anti-reverse. The ratchets are little stops for a dog; as you turn the handle, this part slides over a ramp, and when the dog stops moving, it slides backward and engages a ratchet. The greater the number of ratchets, the quicker it engages; 10 ratchets, for example, mean 10 stops per turn of the handle. More ratchets also mean finer teeth, which are easier to break or clog.

In theory, more ratchet stops could pose a strength problem because you're depending on more ratchets with less material backing to stop the force of the hookset. This seems as if it could be a problem when using low-stretch lines and when using line that is overmatched by strength for the reel. Fewer ratchet stops, however, may be worse because that provides perhaps an extra 4 or 5 inches of rod tip movement when you set the hook before you take up the slack and engage the dog. With a hard hookset using strong low-stretch line and a tight drag, you can develop a lot of force and strip the dog and ratchet system when there is this much rod tip movement.

In a trolling application, where baits or lures are always set out under a fair load, when you have a strike you are already in a position to respond without any backward movement of the handle regardless of the number of ratchets. So in this application there is no relevance. In a casting application, where it is undesirable to have backward travel of the handle when you set the hook, more ratchet stops are advantageous for quick hooksets. A one-way roller bearing, which provides continuous anti-reverse, however, is most desirable. Some baitcasting reels have an optional anti-reverse feature, which means that the anti-reverse can be disengaged so the handle and the spool can be turned either forward or backward. This is accomplished by moving a small spring-loaded lever on the sideplate (usually the right sideplate or handle sideplate). This may be referred to as a direct drive feature, although it is actually a mechanism for disengaging the anti-reverse.

This feature is often preferred for specific fishing applications when anglers want a direct feel of the line for strike detection, for instance, when they are drift fishing and putting the reel in and out of gear frequently, or when they are live-lining bait and want to let line out frequently to follow the movement of the bait. After casting, engage the gear by turning the handle, then disengage the anti-reverse. When a fish takes and runs off, flip the anti-reverse lever into the on position and set the hook. If you leave the anti-reverse disengaged, the reel handle will be free to move wildly backward as line comes off the spool, which could cause trouble. Make sure to keep your hand on the handle if you have the anti-reverse disengaged, or you'll have a runaway handle.

Other Features

Spool. Many people believe that narrower baitcasting spools are easier to cast and to attain distance with than wider ones, but this is a function of many reel elements and not an absolute determination. It is reasonable to believe that there is less friction on the line from the levelwind line guide during a cast because the line comes from less of a side angle when it's at the ends of the narrow spool. Narrow spools are smaller and also lighter, requiring less effort to get them moving, and they are very suitable for lightweight lures. Narrow spools also have less capacity, however, and when there is a lot of line out, it takes more work to recover line when the handle is turned. Wider spools also tend to be used with heavier lures, which provide more momentum in a cast, thus allowing for good distance, all other things being equal.

For a time there was a trend toward narrow V-shaped spools in baitcasting reels; very few of these are still produced because they tend to bunch the line, which impeded smooth outward line flow. Nearly all spools today are level from edge to edge, and capacity is determined by the width as well as the depth.

Many anglers do not need significant line capacity on a baitcasting reel, and most have more line capacity than the average caster needs, even with a thicker diameter line. Some hold just 100 yards of 10-pound test, but most hold about 150 yards of 12-pound line, and some large models hold more than 200 yards of 20-pound line. Naturally, this is

relative to line diameter, which means a reel that holds 100 yards of conventional-diameter 10-pound line might also hold 100 yards of 17-pound line that has the diameter of a conventional 10-pound line *(see: line)*. Although not all reels have this feature, line capacity information, provided on the sideplate of many reels, is very helpful.

Incidentally, baitcasting reels are primarily used with 10- to 20-pound strength line. Some high-quality light models are suitable for use with 8-pound line and possibly with 6; some sturdier models are used with 25- to 40-pound line for special situations.

A recent trend is toward a shallower arbor on a wide baitcasting spool. The smaller depth means that the reel holds less line overall, but because these have less mass in the core region, they are lighter; this means it takes less effort to move the reel on a cast, so they cast very well. For use with light lures and special short-casting situations (bass anglers like this for pitching, *see*), this can be beneficial. Some spools are also perforated to decrease their weight. This also helps because, in general, a lighter spool requires less momentum to start turning, plus it doesn't have the inertia to keep it going, so it's easier to handle, especially for casting light lures.

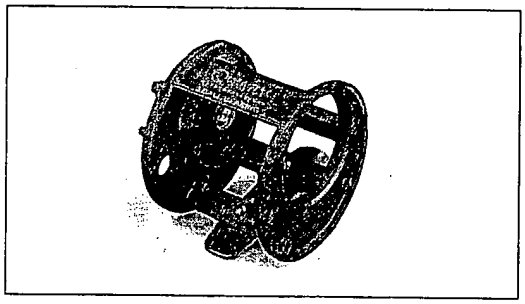
Spools are primarily made of aluminum. Some of the best and higher priced reels have aircraft grade aluminum, and some of the lower end reels have graphite spools. Though lightweight, graphite spools are of dubious value for hard-core fishing with baitcasting reels. They are uncommon in conventional reels, which take much more punishment than the average baitcasting reel because they are frequently broken when subjected to extreme tension and the use of heavy line. A greater discussion about revolving-spool materials and properties is contained with the entry on conventional tackle *(see)*.

One other thing worth noting is that the spools of modern baitcasting reels are very easy to access for changing or to adjust the centrifugal brake shoes. Many reels now feature bayonet-style access to the spool; this is flush to the exterior sideplate that is opposite to the handle, and hands-down the quickest system for spool changing. Such a design is one of the best creations of manufacturers and eliminates the protruding finger-grip screw heads that exist on other reels. Actually, the majority of reels still feature relatively quick access via two or three screw heads that are located on the handle sideplate and which, when completely loosened, detach the entire opposite sideplate or (most commonly) the handle sideplate to provide spool access.

Because spool changing is not that common, most people never use this feature, although they may need it for easy access to the spool for adjusting the centrifugal brake. Rather than changing spools to use their outfit with different strength line (which means derigging and rerigging the same outfit), most anglers simply have multiple baitcasting outfits.

Frame. The weight, material, and construction of the frame can make a difference after many hours of use, and especially depending upon the severity of use in casting, retrieving, and playing fish.

The materials used in the frame and sideplates vary widely. They include one-piece forged aluminum spools on premium reels, as well as one-piece die-cast or machined aluminum and one-piece graphite models. One-piece frames provide superior strength and precision alignment of the spool and other components. One-piece aluminum frames are especially favored for heavy-duty applications; baitcasting reels used for lighter applications may have a multi-piece frame.



A one-piece aluminum frame on baitcasting reels has strength and torque-free advantages, and provides the best possible gear alignment.

Multi-piece frames are also made of aluminum, graphite, and even plastic. Plastic frames are not durable enough for serious use. Graphite frames are generally adequate for most casting activities; graphite has weight and corrosion advantages over aluminum, but even the latest grades of graphite do not yet have the strength of properly manufactured aluminum, so it is not quite as resistant to torque or flexing. Thus, subjecting a graphite reel to a great deal of pressure could result in deterioration in the gears. This is why some reels have a graphite sideplate and an aluminum frame and spool; the weight of a reel with a multi-piece frame can be reduced if the sideplates are graphite, and these do not have much effect on overall strength. Only one sideplate on a reel has a one-piece frame; this is the handle sideplate and it is made of the same material as the frame.

All frames have a reel foot attached to them; this component sits in the reel seat of a rod and may be integral to the frame or riveted on. Riveting is less preferable because rivets can get loose and can't be tightened.

Ergonomics. The shape and weight of baitcasting reels is especially important because these products are either frequently or exclusively used for casting by many anglers. Baitcasting reels were once entirely round in design, but they are now ergonomic, with low profile and teardrop designs very common in addition to round models. Teardrop reels are especially favored by anglers who

tend to palm the reel, so a smooth sideplate that cups neatly into the palm of the rod-holding hand is quite popular.

Although weight is a major concern of manufacturers, this is (or should be) subordinate to having strength and durability. The majority of baitcasting reels weigh between 9 and 12 ounces. Some are between 7 and 9 ounces and mini versions with plastic bodies may weigh less, while large-spool versions may weigh up to 21 ounces. Light weight can make a difference after many hours of use, but so can comfortable styling. A comfortable shape may be more important than overall weight, especially if just fractions of an ounce are involved. If you do not palm the reel when holding it, however, lower weight is probably preferable to shape.

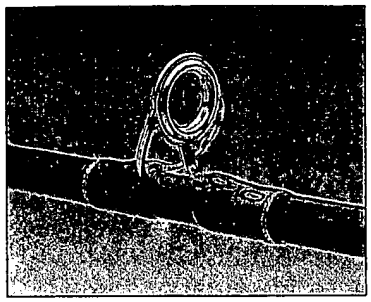
Manufacturers would like to make lighter baitcasting reels, but have not completely figured out how to do it without making disadvantageous sacrifices and compromises. Furthermore, light and ultralight versions of these products have not caught on as well as larger versions, which dominate the market.

Cosmetics, or appearance, has nothing to do with function and doesn't have practical use implications. Handles do have a bearing on comfort and ease of use. Some people like bigger handles than are supplied by the manufacturers and some prefer smaller, and these can be changed. The other aspects of handles relative to speed and power were discussed previously.

Lastly, an overlooked item of convenience, or in many cases inconvenience, is that of threading line from the spool out the line guide or spooling it onto the reel for the first time. It's difficult to put line on many modern baitcasting reels because of the number of bars, narrowness of the spool area, and presence of a reel hood. Many hoods pop up to provide access to the spool for putting line on or for picking out a backlash, but these hoods are more of a nuisance than a help. Round reels with an open metal line guide and medium-width spool are the easiest to handle when putting line on, getting it through the line guide, and picking out a backlash.

Rods

As with most types of rods other than spinning and flycasting, baitcasting rods have guides that mount over the axis of the rod and are placed on top of it, with the reel sitting on top of the handle rather than under it. This arrangement, which is necessary because of the nature of baitcasting reels, is especially well suited to fighting and controlling a fish, as well as for retrieving lures. In a general sense, fighting fish is what this tackle does particularly well; therefore, since the load of a gamefish on the line applies both a crushing downward force on the guide ring and frame, and a simultaneous tendency to torque or twist the rod, guides have to be of top quality and properly spaced and placed.



Guide rings on baitcasting rods have a smaller diameter than those on spinning rods; this is a double-foot guide.

The rings on baitcasting rod guides are smaller than they are on most other tackle because they don't have to accommodate large spirals of line coming from the reel when casting (as in spinning), the line is fairly close to the rod blank when it leaves the reel, and the line is not prone to twisting and coiling on baitcasting reels. Guides may be single- or double-foot versions, with the latter more likely to be used along the entire blank on heavy-action rods or just in the position of the first guide or guides (closest to the reel), and the former generally preferred because it improves rod action and slightly lessens the weight.

Reels mount close to the handle in the reel seat, which makes it fairly comfortable to palm the reel and rod. They are secured in the seat with a locking foregrip that screws down on the reel foot or by a locking ring that screws up on the reel foot.

Baitcasting rod handles are straight or have a pistol grip design, the latter usually found on smaller models. All baitcasting rods that are used for casting have a trigger grip on the underside of the rod, opposite and at the lower end of the reel seat. When you hold the rod, this trigger grip rests under either the middle or ring finger. Rods designed for trolling, which have a long handle, usually do not have a trigger grip so they can fit onto rod holders.

Handle length and overall rod length vary widely according to application, ranging from $5^1/_2$-foot models to 9-footers for steelhead and salmon fishing. Most rods used for casting are in the 6- to $7^1/_2$-foot range.

Baitcasting rods are available in one- and two-piece models. Most of the better rods up to $7^1/_2$ feet long are one piece, although longer models may have a telescoping butt in which the upper section slides into the lower for storage. There are very few travel or pack models among baitcasting rods, but a few excellent ones exist in two-piece versions with a telescoping butt section.

Action, taper, and material construction vary considerably. Baitcasting rods are commonly made of graphite and a mix of graphite and other materials, and many models are specifically tailored to special uses and styles of fishing.

Unlike reels, many of the issues pertaining to baitcasting rods—functions, materials, and

In addition to matching up with the right rod, a particular fly line also matches up with the size and weight of the fly to be used, as well as the conditions (open water and wind being more demanding than sheltered environs). Flies that are very air resistant or that are heavily weighted require greater line sizes, as do windy conditions.

Backing. With the exception of the smallest reels that accommodate the lightest line weights, the nonfishing end of fly line is attached to backing, which is a line that helps fill up the spool and stands in reserve to aid in playing large fish. Without backing it would take more turns of the handle to retrieve line onto the spool, and the line would be stored in small coils, which is harder to stretch out and may inhibit casting by having the line flap against the guides when cast. Backing promotes line storage in large coils, which are more easily straightened for easier use.

Backing also provides a reserve for those instances when a large fish takes a fly and heads to the next county. In most freshwater fishing and some saltwater fishing, the angler seldom gets to the backing on the reel when playing a fish, but when you need it, you'd better have it.

The size of the reel spool in conjunction with the length of the fly line determines how much backing is suitable; in turn, the size of fish that might be encountered and its fighting abilities determine how large a reel and overall capacity (fly line plus backing) is appropriate. Braided Dacron and braided or fused microfilament line, which have very low stretch, are the best products for backing because they wind on easily with less chance of binding than nylon monofilament line; 20-pound strength is standard for use with fly lines up to about the 7-weight class, and 30- or 40-pound strength is used with heavier fly lines. As a rule for the heavier lines, keep in mind the breaking strength of the fly line itself and don't undercut it. Smaller reels require only about 50 yards of lighter backing. The amount of backing necessary on larger reels used for bigger fish is in the 150- to 200-yard range, although greater backing is required for big-game species. Thin-diameter high-tech lines allow for the use of 50- and 60-pound backing line with the diameter of a conventional 20-pound line, and high-tech 30-pound backing with the diameter of conventional 15-pound line means that a much greater amount can also be employed (for more on standard lines, *see: line).*

Reels

Fly reels have long been described as storage devices for fly line that had little or no function in casting or playing fish; this is because they were, until recent decades, mostly used for relatively small fish in freshwater. With the application of fly-casting tackle for very large and strong fish in all environments, reels have evolved into much sturdier products with more functional retrieval and fish-playing characteristics, in addition to being a way to store fly line and backing.

Although some type of reel used for catching fish can be first ascribed to the Chinese around the middle of the twelfth century, the earliest written account of fishing reels appeared in England in 1651 in *The Art of Angling,* a book by Thomas Barker; Izaak Walton even mentioned a "wheel" on a salmon fishing rod in *The Compleat Angler* two years later, and it can be assumed that these developments started an evolution in fishing rods or poles, not the least of which included the creation of guides for the passage of line. By the mid-nineteenth century in Europe, a revolving spool reel called a centrepin was widely used for varied fishing activities, although it had an inert and relatively wide spool and two-handled cranking. This was the forerunner of the fly reel.

Centrepin reels were revolving spool reels, and in appearance they were not unlike the earliest forerunners of baitcasting reels. Still in specialized use today in Europe for coarse fishing with floats *(see),* centrepins are also known as float reels, have a 3- to 4-inch overall diameter, and feature a simple flanged spool on a single axle. They were greatly improved in Nottingham, England, in the mid-nineteenth century by the incorporation of a smooth, free-spinning spool, and the new found sensitivity revolutionized fishing for coarse species.

In the 1870s, several modifications by a number of craftsmen, including Charles Orvis, the founder of that prominent tackle purveyor and creator of the first perforated spool fly reel (1874), made these bulky and heavy reels more suitable for fly fishing

Flycasting reels are basically simple line-storage devices, although some have more advanced drag-control features.

F